



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF RESEARCH AND DEVELOPMENT  
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY  
ENGINEERING TECHNICAL SUPPORT CENTER  
CINCINNATI, OHIO 45268

October 20, 2014

**MEMORANDUM**

**SUBJECT:** Observations on the Missouri Department of Natural Resources report: *Data Package Review for the Month of July and August 2014*, Dated August 29, 2014

**FROM:** John McKernan, ScD, CIH  
Director, ORD Engineering Technical Support Center (ETSC)

**TO:** Lynn Slugantz  
U.S. EPA Region 7

*Disclaimer:* This memorandum contains scientific observations provided in response to a site technical support request with limited scope. The observations herein are intended to address specific scientific questions posed to researchers and/or consultants with applicable experience. Therefore, the observations are written for a specific scientific audience (EPA Offices or Regions). The observations provided are intended to assist EPA Offices and Regions with relevant, innovative science and engineering to help meet site specific environmental goals. The observations are provided in good faith, and due to the limited scope of technical support requests, include substantial uncertainty. This memorandum is not to be considered the only source of information for decision making, nor should the information provided here be parsed. It would be advisable to consider this memorandum in conjunction with multiple lines of evidence including history, experiences of site managers, and other pertinent information available to EPA Office and Regional staff that retain the duties and responsibilities of all decisions and regulatory actions at the site.

This memorandum was prepared in response to your e-mail dated September 10, 2014 that requested the ETSC provide observations on the Missouri Department of Natural Resources (MDNR) report titled, '*Data Package Review for the Month of July and August 2014*,' herein referred to as the report. We note that although the report suggests data from August 2014 were reviewed, the document focuses on data collected at the Bridgeton Landfill in June and July 2014.

ETSC contractors prepared the summary and observations in this memorandum. The observations provided here are based on the following: 1) a review of numerous data sets from the Bridgeton site, up to and including July 2014, 2) a focused review of supporting documents associated with this site from EPA Region 7 and MDNR's websites, 3) knowledge of the SSE at the Bridgeton Landfill, and 4) general knowledge of landfill operations and SSEs.

This memorandum is intended to be a high-level summary. Each discussion point from the report is presented below in **bold type**, and observations related to the discussion points are presented in normal type.

Thank you for the opportunity to review and provide observations on the referenced report. Please feel free to contact me with any questions or comments.

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**Page 1, Paragraph 1. "Temperature, carbon monoxide (CO), and hydrogen all continue to trend upwards."**

**ETSC Observations:** Based upon the data available up to July 2014, we are not able to conclude that an upward trend in temperature, carbon monoxide (CO), and hydrogen exists. Due to the amount of missing data and unknown quality of the data received, high uncertainty exists in this analysis. We noted some increases in the temperature monitoring probe (TMP) data; however, strong data trends were not evident. It is notable that 9 of the original 14 TMPs installed have missing data for many depth intervals. This limits the number and variety of temperature observations available to us. In general, the trend for thermocouple malfunctions (or data not being reported) at discrete depths at each TMP is a phenomenon being observed more frequently over the last few months.

Gas well data are being collected for temperature, CO and hydrogen. Strong data trends among these data are not evident; however, elevated CO and hydrogen levels are not indicative of normal, anaerobic waste decomposition. Our inability to identify strong trends is mostly due to the low vacuum placed on gas extraction wells at the landfill. Low vacuum pressure allows for only small amounts of gas to be collected from the wells and analyzed. We have lower confidence in data generated from analyzing limited amounts of gas, as opposed to larger gas volumes.

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**Page 2, paragraph 5 under “Smolder Movement Data” section: “Based on the above trends, the smoldering event is at or just past the GIW system.”**

ETSC Observations: Based upon the data available up to July 2014, we are not able to substantiate this statement. Limited data are available from temperature monitors (TMPs) in the Neck Area. A few of these TMPs indicate increasing temperatures in the Neck Area and the northern-most part of the North Cell, but not enough to conclusively support this statement. Our inability to substantiate this statement was largely due to data limitations pointed out in the report and the discussion point above. In addition to TMP data, it would be helpful to have settlement data for the entire Neck Area and North Cell. This would help identify the presence and movement of a SSE, if one was present.

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**Page 4, second paragraph under “TMP Concerns”: “Some of the highest temperatures to date have been recorded in July 2014 in the neck area...TMP-8 and 9 are both experiencing significant temperatures above 250° F.”**

ETSC Observations: We concur that elevated temperatures have been observed in several of the TMPs, including some of the highest temperatures measured up to July 2014. We would point out that TMP-8 and TMP-9 have exhibited steady temperatures for several months, although some thermocouple depths for these TMPs have not been monitored for several months, presumably because of malfunctioning thermocouples at those depths. It would be advisable to service the TMP locations, and replace the thermocouple sensors when they either fail or provide data that are inconsistent/questionable.

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**Page 5, under “Recommendations from Data Analysis”: Immediately, approve the experimental cooling loop plan and new TMPs for the “neck” area. All methods to contain this smoldering event in the “neck” should be applied.**

ETSC Observations: We are unable to comment on this item, since we do not have access to the referenced cooling loop work plan. We are not aware of other “methods to contain this smoldering event” outside of the installed GIW system, and the proposed cooling loop plan.

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**Page 5, under “Recommendations from Data Analysis”: Request Bridgeton Landfill sample the GIW system monthly for [carbon monoxide] CO. This data is critical in determining the effectiveness of the GIW system including the new cooling loops and for projecting/predicting the movement of the smoldering event at or through the “neck.” To reduce CO sampling cost to the Bridgeton Landfill, I would recommend exchanging 13 post smoldering event GEW in the South Quarry for 13 GIW in the “neck.”**

ETSC Observations: It is unclear from the report how increased CO monitoring in the GIW will provide an improved view of the effectiveness of the GIW system, since the stated purpose of the GIW system was to remove heat. It is notable that there is no barrier to the north of the GIW system, and therefore the GIWs could theoretically draw gas from anywhere in the landfill (e.g., Neck Area, South Quarry or North Quarry). Signatures of some wells located north of the GIW system showed temperature increases before vacuum pressures on the northern-most GIWs were decreased. Given this knowledge, we are not certain that increased detection of CO at the GIWs is helpful – we wouldn't necessarily know where the CO is coming from, or the cause. To determine where gasses in the GIWs are coming from, a tracer gas could be used.

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**Page 5, under “Recommendations from Data Analysis”: DNR should be provided the chain-of-custody forms and the laboratory data sheets showing the raw data and quality control data for CO testing. This will allow for validation of CO data and ensure all samples were analyzed within the recommended holding times.**

ETSC Observations: This is consistent with recommendations and suggestions we made previously. We echo these comments - details on the sampling procedures used to collect laboratory and field samples (using an instrument called the GEM) should be provided.

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**Page 5, under “Recommendations from Data Analysis”: Request Bridgeton Landfill replace TMPs -3, -4, -5, -6, -11, -12, -13.**

ETSC Observations: We concur that replacing the TMPs or individual thermocouples that are either compromised, failing, or malfunctioning is appropriate. We note that the type and specifications of the thermocouples used, in addition to potential protective measures to enable longer-lasting functionality, should be reconsidered by the operators and MDNR when reviewing any future work plan. To our knowledge, the cause of the thermocouple

malfunctions have not been diagnosed, so it is unclear what additional considerations should be made to ensure the thermocouples last longer.

OC:

Jeff Field

Bradley Vann

Robert Jackson

Robert Weber

David Carson

Thabet Tolaymat